SEMESTER END EXAMINATION APRIL-MAY, 2026

Course Name: - B.TECH. Hons.(CSE with AI&DS) **Semester:- IV**

Paper Name: - OPERATING SYSTEM **Paper Code:- NAD-403**

Time - 3 Hrs + 20 minutes per hour extra time for V.I. & examinees with writer. **Max Marks-70**

Instructions:

- The question paper consists of three sections namely A, B, C. All sections are compulsory.
- Section A- Each question carries **3 mark. All questions are compulsory**.
- Section B- Answer any **5 out of 7** given questions. Each question carries **7 marks**.
- Section C- Answer any **2 out of 3** given questions. Each question carries **10 marks**.

Section - A

Multiple Choice Questions

1. Answer all the following questions. **5x3 =15**

i) Which state is NOT part of process lifecycle?

A) Ready

B) Waiting

C) Running

D) Compiled

ii) Banker's algorithm is used for:

A) Deadlock prevention

B) Deadlock detection

C) Deadlock avoidance

D) Deadlock recovery

iii) Paging eliminates:

A) Internal fragmentation

B) External fragmentation

C) Both

D) Deadlock

iv) Which disk scheduling gives minimum seek time?

A) FCFS

B) SCAN

C) SSTF

D) C-SCAN

v) Page fault occurs when:

A) Page is in memory

B) Page is not in memory

C) CPU is idle

D) Disk fails

ii) Explain in detail about Deadlock prevention, Deadlock avoidance and Deadlock detection. Also ...llowing RAG. Is /are there any 'Safe sequence/s' for given multi, ...each RAG, if possible-then obtain

Section – B
Short Answer Questions

2. Answer any five of the following questions. **5x7=35**

i) Describe the disk architecture in detail along with its diagrammatic representation. Also design a prototype of 1TB disk (Logically).

ii) Elaborate in short with suitable example [ANY THREE]
(i) RACE Condition (ii) Monolithic and Micro Kernel system (iii) RTOS
(iv) Batch Processing System (v) Principal of concurrency (vi)Time Sharing System

iii) Differentiate between Preemptive and Non Preemptive **Priority CPU Scheduling approach** to solve following Problem

Priority	Process Number	Arrival Time	Burst Time	Completion time	Turn Around Time	Waiting Time	Response Time
10	P1	0	5	?	?	?	?
20	P2	1	4	?	?	?	?
30	P3	2	2	?	?	?	?
40	P4	4	1	?	?	?	?

(i) Preemptive approach **and** (ii) Non Preemptive approach

iv) Explain following Disk Access Time
(i) Seek Time (ii) Rotation Time (iii) Rotational Latency (iv)Transfer Time

v) Check DEADLOCK detection and DEADLOCK Avoidance for following:
[Given Total A=13, B=5, C=9]

Process	Allocation			Maximum Need		
	A	B	C	A	B	C
P1	0	1	0	7	5	3
P2	2	0	0	3	2	2
P3	3	0	2	9	0	2
P4	2	1	1	4	2	2
P5	0	0	2	5	3	3

vi) Write Detailed 'Page Table Entry' format with all possible stages. (Structure with explanation each block)

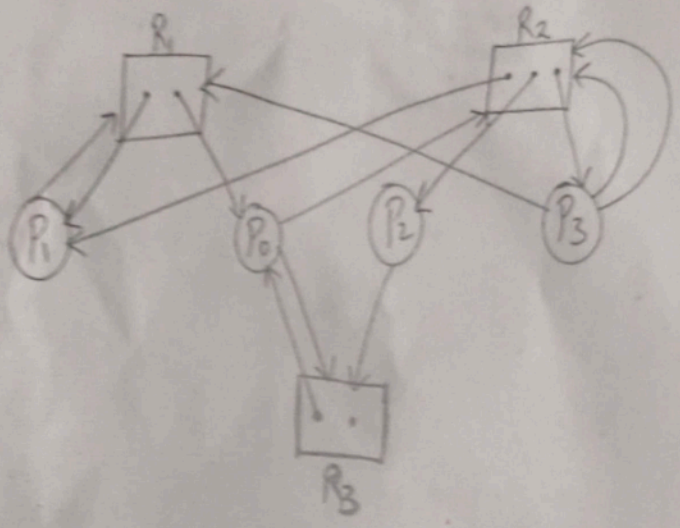
vii) Consider a logical address of 8 pages of 2048 words each, mapped on to a physical memory of 32 frames. How many bits are there in logical address? How many bits are there in physical address? Explain with suitable diagram

Section – C
Descriptive Questions

3. Answer any two of the following question. **2x10=20**

i) A disk contains 200 tracks (0-199), request queue contains track number 82, 170, 43, 140, 24, 16, 190 respectively. Current position of read write head is at 50.
(a) Calculate total number of tracks movement by read/write head using SCAN algorithm and compare its working with C-SCAN, which one is batter?
(b) Calculate total number of tracks movement by read/write head using SSTF algorithm and compare its working with FCFS, which one is batter?
(c) If read / write head takes 1.6 ns to move from one track to another, then calculate total number of time taken.

ii) Explain in detail about Deadlock prevention, Deadlock avoidance and Deadlock detection. Also Check Deadlock for following RAG. Is /are there any 'Safe sequence/s' for given multi instance Resource Allocation Graph [RAG], if possible-then obtain



iii) When does page fault occurs? Explain Page replacement algorithm/strategies for following (Symbols have their usual meanings)

F_4																				
F_3																				
F_2																				
F_1																				

Reference String: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

Evaluate (i) Page Hit Ratio (ii) Page fault Ratio

Using following page replacement algorithm
(i) FIFO
(ii) Optimal Page Replacement

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